

SPECIFICATION

TITLE OF THE INVENTION

IMAGE PROCESSING DEVICE, IMAGE PROCESSING METHOD, IMAGE
5 PROCESSING PROGRAM, AND COMPUTER READABLE RECORDING MEDIUM
ON WHICH THE PROGRAM IS RECORDED

[0001] This application is based on Japanese Patent
Application No. 2002-199187 filed on July 8, 2002, the contents
10 of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

Field of the Invention:

15 [0002] The present invention relates to an image processing
device. More specifically, it is an image processing device
being capable of printing a file attached to an electronic
message when it cannot be received due to the capacity limit
of the mail server by acquiring it from the transmission source
20 or from another transmission destination.

Description of Related Art:

[0003] The use of various multi-function peripheral
("MFP") devices having multiple functions such as scanning,

printing and copying has become popular in recent years. Some of these MFP devices are capable of not only transmitting image data captured by scanning original document images and attaching the image data to electronic mail ("e-mail") messages, but also capable of developing received image data files attached to e-mail messages into bitmap data and printing said data, so that e-mail printing systems for transmitting such printing data attached to e-mail messages to such MFP devices to be printed have come to be used.

10 [0004] In some cases, however, such an e-mail printing system can create a situation where an MFP at the delivery destination cannot print the attachment file as it is prevented from being transmitted due to the capacity limitation of the relaying mail server. In order to solve the problem, there
15 have been several proposals: a method of breaking down an e-mail message into a plurality of e-mail messages at the transmission source device, if the volume of said message exceeds said capacity limitation and restoring the original message from the divided messages at the transmission
20 destination device (US 2001/0013056 A1); a method of storing an attachment file at a specified location of the transmission source device, if it cannot be transmitted due to a size limitation, and later accessing and downloading it from the stored location at the transmission destination device (US

2002/0140986 A1). However, there is a problem with the first method in that the process becomes too complicated as it is necessary for the transmission source device to divide the file in advance into smaller divisions according to a preset upper limit, which suits the smallest capacity limit among the mail servers the message has to deal with in its transmission. Also, there is a problem with the latter method in that it may be impossible for the transmission destination device to access the transmission source device due to the network environment of the transmission source device (firewall, etc.) if the transmission destination device cannot receive an e-mail message due to its size and hence it has to access the transmission source device.

15 SUMMARY OF THE INVENTION

[0005] Since the volumetric upper limit varies with the mail server of each transmission destination as mentioned above, there is a possibility that, even if an MFP device at a transmission destination fails to receive a file attached to an e-mail message due to the capacity limit of a mail server, MFP devices at other transmission destinations may still be able to receive the same attachment file, so that it is more convenient for the MFP device that failed to receive it to acquire it from one of the MFP devices which can be accessed.

[0006] The present invention is intended to solve the problems of the prior art mentioned above by providing an image processing device that is capable of printing attachment files of e-mail that cannot be received due to the mail server's capacity limit by acquiring them either from the transmission source or from another transmission destination.

[0007] Said objective of the present invention can be accomplished by the following means:

[0008] (1) An image processing device comprising: an e-mail receiving means for receiving first e-mail transmitted with an attachment file but deprived of said attachment file due to a capacity limit of a relaying mail server; an e-mail transmitting means for transmitting second e-mail, which contains information of its own online location and a transfer request for transferring said attachment file, to the transmission source and other transmission destinations of said first e-mail in response to receiving of said first e-mail; an attachment file receiving means for receiving said attachment file transmitted in response to said second e-mail from equipment pertaining to the transmission source or another transmission destination of said first e-mail; and an image forming means for forming images of said attachment file in response to receiving of said attachment file.

[0009] (2) An image processing device comprising: a first

e-mail receiving means for receiving first e-mail having an attachment file; an image forming means for forming images for said attachment file; a second e-mail receiving means for receiving second e-mail, which contains online location information of equipment pertaining to another transmission destination of said first e-mail and a transfer request for transferring said attachment file, from said another transmission destination; and an attachment file transferring means for transferring said attachment file to equipment pertaining to said another transmission destination in response to receiving of said second e-mail, when it is possible to access said equipment pertaining to said another transmission destination based on the online location information of said equipment pertaining to said another transmission destination.

[0010] (3) An image processing device comprising: an e-mail transmitting means for transmitting first e-mail having an attachment file; an e-mail receiving means for receiving second e-mail containing online location information of equipment pertaining to transmission destination of said first e-mail and a transfer request for transferring said attachment file, from said transmission destination; and an attachment file transferring means for transferring said attachment file to said equipment pertaining to said

transmission destination in response to receiving of said second e-mail, when it is possible to access said equipment pertaining to said transmission destination based on online location information of said equipment pertaining to said transmission destination.

[0011] (4) An image processing device comprising: a first e-mail receiving means for receiving first e-mail transmitted with an attachment file but deprived of said attachment file due to a capacity limit of a relaying mail server; an e-mail transmitting means for transmitting second e-mail containing a response request for responding online location information of equipment pertaining to the transmission source or other transmission destinations to said transmission source and said other transmission destinations in response to receiving of said first e-mail; a second e-mail receiving means for receiving third e-mail, which contains online location information of equipment pertaining to said transmission source or another transmission destination of said first e-mail, transmitted from said transmission source or said another transmission destination in accordance with said second e-mail; a transfer request transmitting means for transmitting a transfer request for transferring said attachment file to equipment pertaining to said transmission source or said another transmission destination in response

to receiving of said third e-mail, when it is possible to
access to said equipment pertaining to said transmission
source or said another transmission destination based on
online location information of equipment pertaining to said
5 transmission source or said another transmission destination;
an attachment file receiving means for receiving said
attachment file transmitted from said transmission source
or said another transmission destination in response to said
transfer request; and an image forming means for forming images
10 of said attachment file in response to the receiving by said
attachment file receiving means.

[0012] (5) An image processing device comprising: a first
e-mail receiving means for receiving e-mail having an
attachment file; an image forming means for forming images
15 for said attachment file; a second e-mail receiving means
for receiving second e-mail containing a response request
for responding its own online location information from
another transmission destination of said first e-mail; an
e-mail transmission means for transmitting third e-mail
20 containing its own online location information to said another
transmission destination in response to receiving of said
second e-mail; a transfer request receiving means for
receiving a transfer request for transferring said attachment
file transmitted in response to said third e-mail by equipment

pertaining to said another transmission destination; and an attachment file transfer means for transmitting said attachment file to equipment pertaining to said another transmission destination in response to said transfer request.

[0013] (6) An image processing device comprising: a first e-mail transmitting means for transmitting a first e-mail having an attached file; an e-mail receiving means for receiving second e-mail containing a response request for responding its own online location information from the transmission destination of said first e-mail; a second e-mail transmission means for transmitting third e-mail containing its own online location information to said transmission destination in response to receiving of said second e-mail; a transfer request receiving means for receiving a transfer request for transferring said attachment file transmitted from equipment pertaining to said transmission destination in response to said third e-mail; and an attachment file transfer means for transmitting said attachment file to equipment pertaining to said transmission destination in response to said transfer request.

[0014] (7) A mail server comprising: an e-mail receiving means for receiving e-mail having an attachment file; and an e-mail delivery means for delivering said e-mail deprived

of said attachment file to the transmission destination of said e-mail when volume of said e-mail exceeds a specified capacity limit.

[0015] (8) An image processing device comprising: an e-mail
5 receiving part for receiving first e-mail transmitted with
an attachment file but deprived of said attachment file due
to a capacity limit of a relaying mail server; an e-mail
transmitting part for transmitting second e-mail, which
contains information of its own online location and a transfer
10 request for transferring said attachment file, to the
transmission source and other transmission destinations of
said first e-mail in response to receiving of said first e-mail;
an attachment file receiving part for receiving said
attachment file transmitted in response to said second e-mail
15 from equipment pertaining to the transmission source or
another transmission destination of said first e-mail; and
an image forming part for forming images of said attachment
file in response to the receiving by said attachment file
receiving part.

20 [0016] (9) An image processing device comprising: a first
e-mail receiving part for receiving first e-mail having an
attachment file; an image forming part for forming images
for said attachment file; a second e-mail receiving part for
receiving second e-mail, which contains online location

information of equipment pertaining to another transmission destination of said first e-mail and a transfer request for transferring said attachment file, from said another transmission destination; and an attachment file transferring part for transferring said attachment file to equipment pertaining to said another transmission destination in response to receiving of said second e-mail, when it is possible to access said equipment pertaining to said another transmission destination based on the online location information of said equipment pertaining to said another transmission destination.

[0017] (10) An image processing device comprising: an e-mail transmitting part for transmitting first e-mail having an attachment file; an e-mail receiving part for receiving second e-mail containing online location information of equipment pertaining to transmission destination of said first e-mail and a transfer request for transferring said attachment file, from said transmission destination; and an attachment file transferring part for transferring said attachment file to said equipment pertaining to said transmission destination in response to receiving of said second e-mail, when it is possible to access said equipment pertaining to said transmission destination based on online location information of said equipment pertaining to said

transmission destination.

[0018] (11) An image processing device comprising: a first e-mail receiving part for receiving first e-mail transmitted with an attachment file but deprived of said attachment file
5 due to a capacity limit of a relaying mail server; an e-mail transmitting part for transmitting second e-mail containing a response request for responding online location information of equipment pertaining to the transmission source or other transmission destinations to said transmission source and
10 said other transmission destinations in response to receiving of said first e-mail; a second e-mail receiving part for receiving third e-mail, which contains online location information of equipment pertaining to said transmission source or another transmission destination of said first
15 e-mail, transmitted from said transmission source or said another transmission destination in accordance with said second e-mail; a transfer request transmitting part for transmitting a transfer request for transferring said attachment file to equipment pertaining to said transmission
20 source or said another transmission destination in response to receiving of said third e-mail, when it is possible to access to said equipment pertaining to said transmission source or said another transmission destination based on online location information of equipment pertaining to said

transmission source or said another transmission destination;
an attachment file receiving part for receiving said
attachment file transmitted from said transmission source
or said another transmission destination in response to said
5 transfer request; and an image forming part for forming images
of said attachment file in response to the receiving by said
attachment file receiving part.

[0019] (12) An image processing device comprising: a first
e-mail receiving part for receiving e-mail having an
10 attachment file; an image forming part for forming images
for said attachment file; a second e-mail receiving part for
receiving second e-mail containing a response request for
responding its own online location information from another
transmission destination of said first e-mail; an e-mail
15 transmission part for transmitting third e-mail containing
its own online location information to said another
transmission destination in response to receiving of said
second e-mail; a transfer request receiving part for receiving
a transfer request for transferring said attachment file
20 transmitted in response to said third e-mail by equipment
pertaining to said another transmission destination; and an
attachment file transfer part for transmitting said
attachment file to equipment pertaining to said another
transmission destination in response to said transfer

request.

[0020] (13) An image processing device comprising: a first e-mail transmitting part for transmitting a first e-mail having an attached file; an e-mail receiving part for receiving
5 second e-mail containing a response request for responding its own online location information from the transmission destination of said first e-mail; a second e-mail transmission part for transmitting third e-mail containing its own online location information to said transmission destination in
10 response to receiving of said second e-mail; a transfer request receiving part for receiving a transfer request for transferring said attachment file transmitted from equipment pertaining to said transmission destination in response to said third e-mail; and an attachment file transfer part for
15 transmitting said attachment file to equipment pertaining to said transmission destination in response to said transfer request.

[0021] (14) A mail server comprising: an e-mail receiving part for receiving e-mail having an attachment file; and an
20 e-mail delivery part for delivering said e-mail deprived of said attachment file to the transmission destination of said e-mail when volume of said e-mail exceeds a specified capacity limit.

[0022] (15) An image processing method comprising: a step

of receiving first e-mail transmitted with an attachment file but deprived of said attachment file due to a capacity limit of a relaying mail server; a step of transmitting second e-mail, which contains information of its own online location and
5 a transfer request for transferring said attachment file, to the transmission source and other transmission destinations of said first e-mail in response to receiving of said first e-mail; a step of receiving said attachment file transmitted in response to said second e-mail from
10 equipment pertaining to the transmission source or another transmission destination of said first e-mail; and a step of forming images of said attachment file in response to receiving of said attachment file.

[0023] (16) An image processing method comprising: a step
15 of receiving first e-mail having an attachment file; a step of forming images for said attachment file; a step of receiving second e-mail, which contains online location information of equipment pertaining to another transmission destination of said first e-mail and a transfer request for transferring
20 said attachment file, from said another transmission destination; and a step of transferring said attachment file to equipment pertaining to said another transmission destination in response to receiving of said second e-mail, when it is possible to access said equipment pertaining to

said another transmission destination based on the online location information of said equipment pertaining to said another transmission destination.

[0024] (17) An image processing method comprising: a step
5 of transmitting first e-mail having an attachment file; a
step of receiving second e-mail containing online location
information of equipment pertaining to transmission
destination of said first e-mail and a transfer request for
transferring said attachment file, from said transmission
10 destination; and a step of transferring said attachment file
to said equipment pertaining to said transmission destination
in response to receiving of said second e-mail, when it is
possible to access said equipment pertaining to said
transmission destination based on online location information
15 of said equipment pertaining to said transmission
destination.

[0025] (18) An image processing method comprising: a step
of receiving first e-mail transmitted with an attachment file
but deprived of said attachment file due to a capacity limit
20 of a relaying mail server; a step of transmitting second e-mail
containing a response request for responding online location
information of equipment pertaining to the transmission
source or other transmission destinations to said
transmission source and said other transmission destinations

in response to receiving of said first e-mail; a step of receiving third e-mail, which contains online location information of equipment pertaining to said transmission source or another transmission destination of said first e-mail, transmitted from said transmission source or said another transmission destination in accordance with said second e-mail; a step of transmitting a transfer request for transferring said attachment file to equipment pertaining to said transmission source or said another transmission destination in response to receiving of said third e-mail, when it is possible to access to said equipment pertaining to said transmission source or said another transmission destination based on online location information of equipment pertaining to said transmission source or said another transmission destination; a step of receiving said attachment file transmitted from said transmission source or said another transmission destination in response to said transfer request; and a step of forming images of said attachment file in response to receiving of said attachment file.

[0026] (19) An image processing method comprising: a step of receiving e-mail having an attachment file; a step of forming images for said attachment file; a step of receiving second e-mail containing a response request for responding its own

online location information from another transmission destination of said first e-mail; a step of transmitting third e-mail containing its own online location information to said another transmission destination in response to receiving
5 of said second e-mail; a step of receiving a transfer request for transferring said attachment file transmitted in response to said third e-mail by equipment pertaining to said another transmission destination; and a step of transmitting said attachment file to equipment pertaining to said another
10 transmission destination in response to said transfer request.

[0027] (20) An image processing method comprising: a step of transmitting a first e-mail having an attached file; a step of receiving second e-mail containing a response request
15 for responding its own online location information from the transmission destination of said first e-mail; a step of transmitting third e-mail containing its own online location information to said transmission destination in response to receiving of said second e-mail; a step of receiving a transfer
20 request for transferring said attachment file transmitted from equipment pertaining to said transmission destination in response to said third e-mail; and a step of transmitting said attachment file to equipment pertaining to said transmission destination in response to said transfer

request.

[0028] (21) An e-mail delivery method comprising: a step of receiving e-mail having an attachment file; and a step of delivering said e-mail deprived of said attachment file
5 to the transmission destination of said e-mail when volume of said e-mail exceeds a specified capacity limit.

[0029] (22) An image processing program for causing an image processing device to execute: a step of receiving first e-mail transmitted with an attachment file but deprived of said
10 attachment file due to a capacity limit of a relaying mail server; a step of transmitting second e-mail, which contains information of its own online location and a transfer request for transferring said attachment file, to the transmission source and other transmission destinations of said first
15 e-mail in response to receiving of said first e-mail; a step of receiving said attachment file transmitted in response to said second e-mail from equipment pertaining to the transmission source or another transmission destination of said first e-mail; and a step of forming images of said
20 attachment file in response to receiving of said attachment file.

[0030] (23) An image processing program for causing an image processing device to execute: a step of receiving first e-mail having an attachment file; a step of forming images for said

attachment file; a step of receiving second e-mail, which contains online location information of equipment pertaining to another transmission destination of said first e-mail and a transfer request for transferring said attachment file, 5 from said another transmission destination; and a step of transferring said attachment file to equipment pertaining to said another transmission destination in response to receiving of said second e-mail, when it is possible to access said equipment pertaining to said another transmission 10 destination based on the online location information of said equipment pertaining to said another transmission destination.

[0031] (24) An image processing program for causing an image processing device to execute: a step of transmitting first 15 e-mail having an attachment file; a step of receiving second e-mail containing online location information of equipment pertaining to transmission destination of said first e-mail and a transfer request for transferring said attachment file, from said transmission destination; and a step of transferring 20 said attachment file to said equipment pertaining to said transmission destination in response to receiving of said second e-mail, when it is possible to access said equipment pertaining to said transmission destination based on online location information of said equipment pertaining to said

transmission destination.

[0032] (25) An image processing program for causing an image processing device to execute: a step of receiving first e-mail transmitted with an attachment file but deprived of said
5 attachment file due to a capacity limit of a relaying mail server; a step of transmitting second e-mail containing a response request for responding online location information of equipment pertaining to the transmission source or other transmission destinations to said transmission source and
10 said other transmission destinations in response to receiving of said first e-mail; a step of receiving third e-mail, which contains online location information of equipment pertaining to said transmission source or another transmission destination of said first e-mail, transmitted from said
15 transmission source or said another transmission destination in accordance with said second e-mail; a step of transmitting a transfer request for transferring said attachment file to equipment pertaining to said transmission source or said another transmission destination in response to receiving
20 of said third e-mail, when it is possible to access to said equipment pertaining to said transmission source or said another transmission destination based on online location information of equipment pertaining to said transmission source or said another transmission destination; a step of

receiving said attachment file transmitted from said transmission source or said another transmission destination in response to said transfer request; and a step of forming images of said attachment file in response to receiving of
5 said attachment file.

[0033] (26) An image processing program for causing an image processing device to execute: a step of receiving e-mail having an attachment file; a step of forming images for said attachment file; a step of receiving second e-mail containing a response
10 request for responding its own online location information from another transmission destination of said first e-mail; a step of transmitting third e-mail containing its own online location information to said another transmission destination in response to receiving of said second e-mail; a step of
15 receiving a transfer request for transferring said attachment file transmitted in response to said third e-mail by equipment pertaining to said another transmission destination; and a step of transmitting said attachment file to equipment pertaining to said another transmission destination in
20 response to said transfer request.

[0034] (27) An image processing program for causing an image processing device to execute: a step of transmitting a first e-mail having an attached file; a step of receiving second e-mail containing a response request for responding its own

online location information from the transmission destination of said first e-mail; a step of transmitting third e-mail containing its own online location information to said transmission destination in response to receiving of said
5 second e-mail; a step of receiving a transfer request for transferring said attachment file transmitted from equipment pertaining to said transmission destination in response to said third e-mail; and a step of transmitting said attachment file to equipment pertaining to said transmission destination
10 in response to said transfer request.

[0035] (28) An e-mail delivery program for causing an e-mail server to execute: a step of receiving e-mail having an attachment file; and a step of delivering said e-mail deprived of said attachment file to the transmission destination of
15 said e-mail when volume of said e-mail exceeds a specified capacity limit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] Fig. 1 is a block diagram showing the entire
20 constitution of an image processing system including an image processing device according to a first embodiment of the present invention.

[0037] Fig. 2 is a block diagram showing the constitution of MFP 11a, 12a, 13a and 14a pertaining to this embodiment.

[0038] Fig. 3 is a block diagram showing an example of the constitution of mail servers 21a, 22a, 23a and 24a pertaining to this embodiment.

[0039] Fig. 4 is a sequence chart showing the image processing procedure of an image processing system according to this embodiment.

[0040] Fig. 5 is a flowchart for describing the steps of the e-mail transmitting process of MFP 14a according to this embodiment.

10 [0041] Fig. 6 shows an example of e-mail generated by MFP 14a according to this embodiment.

[0042] Fig. 7 is a flowchart showing the steps of the e-mail delivery process of mail server 21a to MFP 11a according to this embodiment.

15 [0043] Fig. 8 shows an example of e-mail, wherein the attachment file is removed due to the capacity limit as it is being delivered by mail server 21a to MFP 11a according to this embodiment.

[0044] Fig. 9 and Fig. 10 are a flowchart showing the image forming process of MFP 11a according to this embodiment.

20 [0045] Fig. 11 shows an example of attachment file transfer request mail transmitted by MFP 11a to the transmission source and other transmission destinations according to this embodiment.

[0046] Fig. 12 is a block diagram showing the entire constitution of an image processing system including an image processing device according to a second embodiment of the present invention.

5 [0047] Fig. 13 is a sequence chart showing the image processing procedure of the image processing system according to this embodiment.

[0048] Fig. 14 - 16 are a flowchart showing the image forming process of MFP 11b according to this embodiment.

10 [0049] Fig. 17 shows an example of IP address response request mail transmitted by MFP 11b to the transmission source and other transmission destinations according to this embodiment.

[0050] Fig. 18 shows an example of IP address response mail
15 responded by MFP 12b to MFP 11b according to this embodiment.

[0051] Fig. 19 is a block diagram showing the entire constitution of an image processing system including an image processing device according to a third embodiment of the present invention.

20 [0052] Fig. 20 is a sequence chart showing the image processing procedure of the image processing system according to this embodiment.

[0053] Fig. 21 is a flowchart for describing the procedure of the e-mail transmitting process of MFP 14c according to

this embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0054] The preferred embodiments of the invention will be
5 described in detail below with reference to the accompanying
drawings.

[0055] Fig. 1 is a block diagram showing the entire
constitution of an image processing system including an image
processing device according to a first embodiment of the
10 present invention. The image processing system according to
this embodiment is equipped with an image processing device
consisting of MFP 11a, 12a, 13a and 14a and mail servers 21a,
22a, 23a, and 24a, wherein pairs of MFP 11a and mail server
21a, MFP 12a and mail server 22a, MFP 13a and mail server
15 23a, and MFP 14a and mail server 24a are each communicably
connected via networks 31, 32, 33 and 34 respectively.
Moreover, networks 31 and 32 constitutes a portion of a network
30, while networks 30, 33 and 34 are all connected to a network
35. The types and the number of equipment to be connected
20 to networks 30 through 35 are not limited to those shown in
Fig. 1.

[0056] Next, constitution of each device mentioned above
will be described below, but the description of a function
common to multiple devices will be made only once when it

appears and will not be repeated afterwards in order to avoid duplicate descriptions.

[0057] Fig. 2 is a block diagram showing the constitution of MFP 11a, 12a, 13a and 14a pertaining to this embodiment.

5 As shown in Fig. 2, MFP 11a, 12a, 13a and 14a are each equipped with a CPU 101, a ROM 102, a RAM 103, a hard disk 104, an operating panel unit 105, an image scanning unit 106, a printing unit 107, and a network interface 108, and they are interconnected via a bus 109 for the purpose of signal
10 exchanges.

[0058] CPU 101 controls various parts indicated above and executes various arithmetic processes according to a program. ROM 102 stores various programs and parameters. RAM 103 stores programs and data temporarily as a working area. Hard disk
15 104 stores various programs and parameters and is used for storing image data acquired by image processing, etc. In this embodiment, MFP 11a, 12a, 13a and 14a perform various operations to be described later and the programs for controlling such operations of MFP are stored either in ROM
20 102 or hard disk 104, and are executed by CPU 101 after they are read from RAM 103 during the start of an operation.

[0059] Operating panel unit 105 is equipped with a touch screen where various kinds of information are displayed, a ten-key pad to be used for setting up the number of copies

to be produced and the like, a start key for instructing the start of an operation, a stop key for instructing the stoppage of an operation, a reset key for initializing various setup conditions, etc.

5 **[0060]** Image scanning unit 106 casts light on a document set on a specified location from a light source such as a fluorescent lamp and the like, converts reflected lights from the document surface into electrical signals with the use of light sensitive devices such as CCD or CIS, and generates
10 image data (bitmap data) from the electrical signals. Image scanning unit 106 is also equipped with an automatic document feeder ("ADF") that transfers a document consisting of multiple sheets one sheet at a time to the specified location so that they can be scanned sequentially.

15 **[0061]** Printing unit 107 prints the image data after image processing according to the setup condition.

[0062] Network interface 108 is an interface for allowing the system to access a network and communicate with other equipments on the network.

20 **[0063]** Since MFP 11a, 12a, 13a and 14a are constituted as described in the above, they have a function as a scanner for scanning the document, a function as a printer for printing the image data received from another equipment on the network, and a function as a copying machine for scanning the document

and printing the image data.

[0064] MFP 11a, 12a, 13a and 14a also have functions of transmitting and receiving e-mail and are capable of transmitting and receiving to and from other communication
5 equipments on network 35 having functions of transmitting and receiving e-mail via networks 30, 31, 32, 33 and 34, mail servers 21a, 22a, 23a and 24a, and network 35. Therefore, they have functions to attach image data acquired by scanning the document image or another files to e-mail, and to develop
10 files attached to e-mail received into bitmaps to be issued for printing.

[0065] Fig. 3 is a block diagram showing an example of the constitution of mail servers 21a, 22a, 23a and 24a pertaining to this embodiment. Mail servers 21a, 22a, 23a and 24a are
15 computers that provide e-mail reception and transmission services for MFP 11a, 12a, 13a and 14a respectively, and are equipped with a CPU 201, a ROM 202, a RAM 203, a hard disk 204, a display 205, an input device 206, a network interface 207 and a bus 208.

20 [0066] Display 205 displays various matters. Input device 206 consists of a keyboard, a mouse and others, and is used for making various kinds of inputs.

[0067] While each of mail servers 21a, 22a, 23a and 24a provide services of e-mail transmission and reception using

a single computer, SMTP protocol for transmission, and IMAP 4, POP 3 and other protocols for reception, it is also possible to have separate mail servers, one for reception and another for transmission using separate computers.

5 [0068] Each mail server generally has a capacity limitation for e-mail it handles in order to prevent problems such as system breakdown due to overloading by e-mail it handles; as such, each of mail servers 21a, 22a, 23a and 24a is set up with a capacity limit for e-mail and is capable of
10 transferring or delivering e-mail received by removing the attachment file if the attachment file exceeds the specified capacity limit.

[0069] Networks 30, 31, 32, 33 and 34 are internal networks (intranets) consisting of LANs created by connecting
15 computers and network equipment based on standards such as Ethernet®, Token Ring, and FDDI, or WANs consisting of LANs connected with each other by means of dedicated lines, and network 35 represents an external network such as the Internet or public networks consisting of LANs and WANs interconnected
20 to each other.

[0070] Next, the outline of the image processing system according to this embodiment will be described below. With respect to this embodiment, it is described hereunder a case where e-mail with an attachment file containing image data

is acquired by scanning a document image and is transmitted by MFP 14a to MFP 11a, 12a and 13a to be printed out by MFP 11a, 12a and 13a. Mail servers 21a, 22a, 23a and 24a have upper limits as to the e-mail capacity that can be handled
5 by each of them and it is assumed here that the e-mail that MFP 14a is transmitting exceeds only the capacity limit of mail server 21a, which is the mail server of MFP 11a, and that it does not exceed the capacity limits of the other mail servers (the same assumption applies to all other embodiments
10 of the present invention).

[0071] First, let us make a brief description of the procedures of the image process of the entire image processing system according to the present embodiment. Fig. 4 is a sequence chart showing the image processing procedure of the
15 image processing system according to this embodiment. In Fig. 4, MFP 14a acquires the image data by scanning the document image, prepares e-mail attached with a file containing said imagedata (S101), and transmits the e-mail to its transmission destinations, MFP 11a, 12a and 13a (S102). When mail server
20 24a receives the e-mail from MFP 14a, it then transfers the received e-mail to mail servers 21a, 22a and 23a (S103).

[0072] When mail servers 22a and 23a receive the e-mail from mail server 24a, they deliver the received e-mail to MFP 12a and 13a (S104 and S105). Incidentally, it is assumed

here that the mail servers' actions of delivering the e-mail to their clients (transmission destination devices) include modes of operations such that a transmission destination device downloads e-mail addressed to its own mailing address
5 upon receiving an e-mail receiving notice from a monitoring program on its mail server, or by accessing its mail server regularly on a specified timing or on an arbitrary timing (the same assumption applies to all other cases throughout the specification). Upon receiving the e-mail from mail
10 servers 22a and 23a, MFP 12a and 13a develop the attachment file of the received e-mail into bitmap data and print them out (S106 and S107).

[0073] On the other hand, upon receiving the e-mail from mail server 24a, mail server 21a removes the attachment file
15 as the received e-mail exceeds the capacity limit (S108), and delivers the e-mail without the attachment file to MFP 11a (S109).

[0074] Upon receiving the e-mail from mail server 21a, as the attachment file of said e-mail is removed due to the
20 capacity limitation of mail server 21a, MFP 11a transmits e-mail (attachment file transfer request mail) that contains its own IP address (i.e., information of its own online location) and a transfer request to MFP 14a, which is the transmission source of said e-mail, as well as to other

transmission destinations MFP 12a and 13a (S110). Upon receiving the attachment file transfer request mail from MFP 11a, mail server 21a transfers it to mail servers 22a, 23a and 24a (S111); upon receiving it, mail servers 22a, 23a and 5 24a deliver it to MFP 12a, 13a and 14a (S112, A113 and S114).

[0075] Upon receiving the attachment file transfer request mail, MFP 12a, 13a and 14a try to access MFP 11a based on the IP address of MFP 11a contained in the attachment file transfer request mail. Since MFP 11a is on the external 10 network, MFP 13a and MFP 14a are prevented from accessing MFP 11a by means of protective walls such as firewalls. On the other hand, since MFP 12a is located within the same internal network as MFP 11a, so that it can access MFP 11a via networks 32, 30 and 31. Therefore, MFP 12a transfers said 15 attachment file it has received and kept to MFP 11a via network(S115). Upon receiving said attachment file from MFP 12a, MFP 11a develops the received attachment file into bitmap data and prints it out (S116).

[0076] Next, let us describe in detail the key procedures 20 of the image processing of each device in this embodiment. Fig. 5 is a flowchart for describing the procedure of the e-mail transmitting process of MFP 14a, which is the transmission source of the e-mail according to this embodiment. In Fig. 5, MFP 14a sets up the transmission destinations of

the e-mail, the printing conditions of the attachment file and others according to the input from the user (S201). Using operating panel unit 105, the user enters e-mail addresses of the transmission destinations of the e-mail, i.e., MFP 5 11a, 12a and 13a, the printing conditions of the attachment file, the image scanning conditions such as resolution, size, distinction of color vs. monochromatic, and type of file of the acquired image data, etc. After setting up the transmission destinations of the e-mail, etc., MFP 14a waits 10 for an image scanning order (S202: No). The user sets up the document at a specified location on the document table and presses the start key on operating panel unit 105. Upon receiving a scanning order (S202: yes), MFP 14a scans the document image based on the image scanning condition by means 15 of image scanning unit 106 and stores the image data thus acquired on hard disk 104 (S203).

[0077] Next, MFP 14a prepares an e-mail message accompanied with the acquired image data as an attachment file based on the e-mail transmission destinations and the printing 20 conditions and others set up in step S201 (S204). Fig. 6 is an example of e-mail generated by MFP 14a according to this embodiment. In Fig. 6, the transmission destination box of e-mail 41 shows the e-mail address of MFP 11a, "mfpl1a@mail21a.net30.com" ("To"), as well as the e-mail

addresses of MFP 12a and 13a, "mfpl2a@mail22a.net30.com" and "mfpl3a@mail23a.net33.com" ("Cc"), as the e-mail transmission destinations set up in step S201. In the attachment file box of e-mail 41 contains an image file
5 "scan#001.jpg" pertaining to the image data acquired in step S203 and the body includes the printing condition of the attached file set up in step S201. MFP 14a transmits the prepared e-mail to mail server 21a via network interface 108 and network 34 (S205).

10 [0078] Files to be attached to e-mail in the e-mail transmission procedure for MFP 14a described in the above are not necessarily limited to the image data acquired by image scanning unit 106 but can be files of various file format acquired from other equipments on the network, in which case
15 MFP 14a prepares the e-mail by receiving the files to be attached via network 34 and network interface 108.

[0079] Fig. 7 is a flowchart showing the steps of the e-mail delivery process of mail server 21a to MFP 11a according to this embodiment. The procedures of e-mail delivery processes
20 by mail servers 22a and 23a to MFP 12a and 13a are similar to the above. In Fig. 7, mail server 21a waits for e-mail from other mail servers (S301: No). When e-mail is received from another mail server via networks 35, 30 and 31 (S301: Yes), the volume of the received e-mail is checked (S302),

the volume of the received e-mail is compared with the upper limit of the capacity and, if it is less than the upper limit (S303: Yes), the received e-mail is delivered to MFP 11a; in other words, it is then stored in a mail box of the hard disk of mail server 21a pertaining to the mail address of MFP 11a (S306). The upper limit for the e-mail's volume is set up in advance by the manager of mail server 21a through input device 206 and is stored in hard disk 204, etc.

[0080] On the other hand, if the volume of the received e-mail exceeds the capacity upper limit (S303: No), the attachment file of said e-mail is removed (S304), and a notice that the attachment file is removed due to the capacity limit ("attachment file removal notice") is added to said e-mail (S305) and is delivered to MFP 11a (S306). Fig. 8 shows an example of electronic mail, wherein the attachment file is removed due to the capacity limit as it is being delivered by mail server 21a to MFP 11a according to this embodiment. In Fig. 8, e-mail 42 has the same content as that of e-mail 41 except that the attachment file, "scan#001.jpg" is removed and that an attachment file removal notice is added in the body notifying that the attachment file is removed due to the capacity limit. As can be seen from the above, the attachment file removal notice to be included in the e-mail deprived of the attachment file due to the capacity limit

can be either added to the body of the e-mail or can be made as separate text file to be attached to the e-mail.

[0081] Fig. 9 and Fig. 10 are a flowchart showing procedure of the image forming process of MFP 11a, which is the e-mail transmission destination according to this embodiment. The
5 procedures of the image forming processes for MFP 12a, 13a and 14a are similar to this. In Fig. 9 and Fig. 10, MFP 11a waits for the e-mail to arrive (S401: No). Upon receiving the mail arrival notice from a monitoring program on mail
10 server 21a, or accessing mail server 21a periodically on a regular timing or an arbitrary timing, MFP 11a receives e-mail addressed to its own mail address (S401: Yes), and stores the received e-mail on hard disk 104. Next, a judgment as to whether the received e-mail is concerned with e-mail
15 printing is made from the mail title and the contents of the body, etc. If it is judged to be e-mail concerning e-mail printing (S402: Yes), a further judgment is made as to whether an attachment file removal notice is included. If no attachment file removal notice is included (S403: No), the
20 attachment file of said e-mail is developed into bit map data (S406), and it is printed out by printing unit 107 (S407).

[0082] In step S403, if an attachment file removal notice is included (S403: Yes), attachment file transfer request mail containing its own IP address is transmitted to the

transmission source and other transmission destinations of said e-mail (S404). Fig. 11 is an example of attachment file transfer request mail transmitted by MFP 11 to the transmission source and other transmission destinations according to this embodiment. In Fig. 11, attachment file transfer request mail 43 has the mail addresses of MFP 14a, which is the transmission source of e-mail 42, as well as MFP 12a and 13a, which are the other transmission destinations of e-mail 42, set up as the transmission destinations. Also, the body of attachment file transfer request mail 43 contains an attachment file transfer request requesting the removed attachment file "scan#001.jpg" be transferred to "111.222.333.444" which is the IP address of MFP 11a.

[0083] In Fig. 9 and Fig. 10, after transmitting the attachment file transfer request, MFP 11a waits until the attachment file is received (S405: No); upon receiving the attachment file from an MFP of the transmission source or another transmission destination via network 31 and network interface 108 (S405: Yes), it stores the received attachment file on the hard disk 104, develops the attachment file into bitmap data (S406), and prints it out by means of printing unit 107 (S407).

[0084] It is also possible to constitute the system in such a way that MFP 11a conducts access certification when an MFP

pertaining to said transmission source or another transmission destination attempts to access MFP 11a in order to transmit the attachment file, wherein the file transfer request mail that MFP 11a transmits to the transmission source and other transmission destinations contains an ID, a password and the like required for said certification, so that the MFP pertaining to said transmission source or another transmission destination requests certification using the ID, password, and the like.

10 [0085] On the other hand, if the e-mail received at step S401 happens to be attachment file transfer request mail from another MFP (S401: Yes; S402: No; S408: Yes), there may be a chance that the attachment file cannot be received even at MFP 11a, so that hard disk 104 is checked to see if it
15 contains the attachment file related to the transfer request. If said attachment file is contained (S409: Yes), the IP address of said another MFP contained in the attachment file transfer request mail together with the attachment file transfer request is extracted (S410). If it is possible to access
20 to said another MFP based on the extracted IP address (S411: Yes), the attachment file is transferred to said another MFP via network interface 108 and network 31 (S412).

[0086] Fig. 12 is a block diagram showing the entire constitution of an image processing system including an image

processing device according to a second embodiment of the present invention. The image processing system according to this embodiment is equipped with MFP 11b, 12b, 13b and 14b as the image processing device as well as mail servers 21a, 22a, 23a and 24a, and all of them are interconnected so that they can communicate with each other via network 30, 31, 32, 33, 34 and 35 similar to the first embodiment described above. The constitutions and functions of MFP 11b, 12b, 13b and 14b are similar to those of MFP 11a, 12a, 13a and 14a in the first embodiment, and the constitutions and functions of mail servers 21a, 22a, 23a and 24a as well as networks 30, 31, 32, 33, 34 and 35 are similar to the corresponding items of the first embodiment.

[0087] Next, the outline of the image processing system according to this embodiment will be described below. Fig. 13 is a sequence chart showing the image processing procedure of the image processing system according to this embodiment. In Fig. 13, MFP 14b transmits e-mail attached with image data, which is acquired by scanning the document, to MFP 11b, 12b and 13b in a similar manner as in the operation of MFP 14a of the image processing system according to the first embodiment. MFP 12b and 13b receive said e-mail and print the attachment file, while MFP 11b receives e-mail deprived of the attachment file due to the capacity limit of mail server

21a (S501 - S509).

[0088] Upon receiving the e-mail deprived of the attachment file from mail server 21a, MFP 11b transmits e-mail for requesting response of IP address (IP address response request mail) to MFP 14b, which is the transmission source, and MFP 12b and 13b, which are other transmission destinations of said e-mail (S510). Upon receiving the IP address response request mail from MFP 11b, mail server 21a transmits it to mail servers 22a, 23a and 24a (S511), mail servers 22a, 23a and 24a receive it and deliver it to MFP 12b, 13b and 14b (S512, S513 and S514).

[0089] Upon receiving the IP address response request mail, MFP 12b, 13b and 14b return e-mail messages containing their own IP addresses (IP address response mail) to MFP 11b respectively (S515, S516 and S517); upon receiving them, mail servers 22a, 23a and 24a transmits them to mail server 21a (S518, S519 and S520), upon receiving them, mail server 21a delivers them to MFP 11b (S521).

[0090] Upon receiving IP address response mail messages from MFP 12b, 13b and 14b, MFP 11b attempts to access each MFP based on the IP addresses contained in the received IP address response mail messages. MFP 13b and MFP 14b are inaccessible due to protective walls such as firewalls as they are located on external networks, while MFP 12b is located

within the same internal network so that it is accessible via networks 31, 30 and 32. Therefore, MFP 11b transmits a transfer request for said attachment file to MFP 12b via the networks (S522), upon receiving it, MFP 12b transmits said
5 attachment file to MFP 11b via the networks (S523). Upon receiving said attachment file from MFP 12b, MFP 11b develops the received attachment file into bitmap data and prints it out (S524).

[0091] Next, the procedures of image forming process by
10 the MFP at the e-mail transmission destination will be described below in detail. Fig. 14 - 16 are a flowchart showing the image forming process of MFP 11b according to this embodiment. The procedures of the image forming processes for MFP 12b, 13b and 14b are similar to this. In Fig. 14 -
15 16, when e-mail is received (S601: Yes), if the received e-mail is e-mail concerning e-mail printing and it contains an attachment file removal notice (S602: Yes and S603: Yes), MFP 11b transmits IP address response request mail to the transmission source and other transmission destinations of
20 said e-mail (S604). Fig. 17 is an example of IP address response requesting mail transmitted by MFP 11b to the transmission source and other transmission destinations according to this embodiment. In Fig. 17, IP address response request mail 44 has the mail addresses of MFP 14b, which is

the transmission source of the e-mail, as well as MFP 12b and 13b, which are the other transmission destinations of the e-mail, set up as the transmission destinations. Moreover, the body of IP address response request mail 44 includes the
5 IP address response request asking to respond the IP address so that the removed attachment file "scan #001.jpg" can be downloaded.

[0092] In Fig. 14 - 16, after transmitting the IP address response request mail, MFP 11b waits until response e-mail
10 is received (S601: No); upon receiving IP address response mail from the transmission source or another transmission destination containing the IP address of the corresponding MFP (S601: yes; S602: No; and S605: yes), it extracts the IP address of the corresponding MFP from the received IP address
15 response mail (S606). Fig. 18 shows an example of IP address response mail responded by MFP 12b to MFP 11b according to this embodiment. In Fig. 18, the body of IP address response mail 45 contains the IP address of MFP 12b, "111.222.333.555."

[0093] Next, in Fig. 14 - 16, if MFP 11b can access to the
20 MFP corresponding to the extracted IP address (S607: Yes), it transmits an attachment file transfer request to said MFP via network interface 108 and network 31 (S608). It waits until it receives the attachment file from said MFP (S609: No), stores the attachment file to the hard disk when it

receives the attachment file from said MFP via network 31 and network interface 108 (S609: yes), develops the attachment file to bitmap data (S610), and prints it out by means of printing unit 107 (S611).

5 [0094] Incidentally, the system can also be constituted in such a way that said MFP has to go through an access certification procedure when MFP 11b accesses said MFP in order to receive the attachment file, in which case the IP address response request mail which MFP 11b transmits to the
10 transmission source and other transmission destinations contains a response request for information such as ID and password that are required for said certification procedure, and MFP 11b goes through said certification using the information such as ID and password that are contained in
15 the IP address response mail received from said MFP.

[0095] On the other hand, if the e-mail received in step S601 is an IP address response request mail from another MFP (S601: yes; S602: No; S605: No; and S612: Yes), a search for said attachment file is made in hard disk 104, and if said
20 attachment file exists (S613: Yes), IP address response mail containing its own IP address is returned to said another MFP (S614). It then waits a transfer request for the attachment file to arrive from said another MFP (S615: No), and, upon receiving the attachment file transfer request from

said another MFP via network 31 and network interface 108 (S615: Yes), it then transmits the attachment file to said another MFP via network interface 108 and network 31 (S616).

[0096] Fig. 19 is a block diagram showing the entire
5 constitution of an image processing system including an image processing device according to a third embodiment of the present invention. The image processing system according to this embodiment is equipped with MFP 11c, 12c, 13c and 14c as the image processing device as well as mail servers 21b,
10 22b, 23b and 24b, and all of them are interconnected so that they can communicate with each other via network 30, 31, 32, 33, 34 and 35 similar to the first embodiment described above. The constitutions and functions of MFP 11c, 12c, 13c and 14c are similar to those of MFP 11a, 12a, 13a and 14a in the first
15 embodiment, and the constitutions and functions of mail servers 21b, 22b, 23b and 24b are similar to those of mail servers 21a, 22a, 23a and 24a of the first embodiment. However, mail servers 21b, 22b, 23b and 24b do not have the functions of removing attachment files of e-mail that exceed the capacity
20 limits, while they have the functions of refusing to deliver said e-mail, if the received e-mail exceeds the preset capacity limits, and issuing e-mail to the transmission source notifying of the situation. The constitutions and functions of network 30, 31, 32, 33, 34 and 35 are similar to those

described for the first embodiment.

[0097] Next, the outline of the image processing system according to this embodiment will be described below. Fig. 20 is a sequence chart showing the image processing procedure of the image processing system according to this embodiment. In Fig. 20, MFP 14c transmits e-mail attached with image data, which is acquired by scanning the document, to MFP 11c, 12c and 13c in a similar manner as in the image processing system according to the first embodiment; upon receiving the e-mail, mail servers 22b and 23b deliver it to MFP 12c and 13c; and MFP 12c and 13c prints the attachment file of the e-mail received (S701 - S707).

[0098] On the other hand, since the received e-mail exceeds the capacity limit, mail server 21b refuses to deliver it to MFP 11c, and issues e-mail containing the notice that the e-mail's delivery is refused due to the capacity limitation (delivery refusal notice mail) addressed to MFP 14c, the transmission source (S708), which is then delivered to MFP 14c by mail server 24b in turn (S709). Upon receiving the delivery refusal notice mail, MFP 14c deletes the attachment file from the original e-mail (S710), and retransmits the e-mail deprived of the attachment file to MFP 11c (S711). Mail server 24b then transfers it to mail server 21b (S712), and mail server 21b delivers it to MFP 11c (S713).

[0099] Upon receiving the e-mail deprived of the attachment file, MFP 11c transmits attachment file transfer request mail to MFP 12c, 13c and 14c, receives as a result the attachment file from MFP 12c, and prints it out in a similar manner as
5 in the operation of MFP 11a of the image processing system of the first embodiment (S714 - S720).

[0100] Next, the procedures of e-mail transmission process by the MFP at the e-mail transmission source will be described below in detail. Fig. 21 is a flowchart for describing the
10 procedure of the electronic mail transmitting process of MFP 14c according to this embodiment. In Fig. 21, MFP 14c acquires the image data by scanning the document image, prepares e-mail attached with a file containing said image data, and transmits the e-mail to mail server 24b via network interface 108 and
15 network 34 in a similar manner as in the e-mail process transmission process for MFP 14a in the first embodiment (S801 - S805). If delivery refusal notice mail is received from the mail server pertaining to the transmission destination (S806: Yes), the attachment file is removed from the original
20 e-mail (S807), attachment file removal notice is added to said e-mail as in e-mail 42 (Fig. 8) of the aforementioned first embodiment (S808), and retransmitted to said mail server (S809).

[0101] Although it was assumed in the aforementioned

embodiments that the image processing device according to the present invention is an MFP having scanning, printing, copying and e-mail printing functions, the image processing device according to the present invention is not limited it.

5 Other modes of the image processing device according to this invention include scanners, printers, digital copying machines, facsimile machines, e-mail printers and the like, either as a standalone unit or an MFP having a combination of their functions.

10 [0102] The image processing device and the method of image processing, as well as mail servers and mail delivery method, according to this invention can be realized by a dedicated hardware circuit for executing the abovementioned steps, or by causing a CPU to execute a program where said steps are
15 described. If the present invention is to be materialized by the latter means, the specified programs for operating the image processing device and the like can be provided by computer-readable recording media such as a floppy® disk and CD-ROM, or can be provided on-line via a network such as the
20 Internet. In this case, the program recorded on the computer readable recording medium is normally transferred to and stored in a memory device such as ROM and a hard disk. The program can also be provided as independent application software or can be built into the software of the image

processing device as a part of its function.

[0103] As mentioned above, an image processing device according to the present invention is capable of acquiring and printing out an attachment file by asking the transmission
5 source or another transmission destination, which has received the file, to transmit it, even when the attachment file cannot be delivered with the original e-mail due to a mail server's capacity limit.

[0104] Also, an image processing device according to the
10 present invention is capable of acquiring and printing out an attachment file by accessing the transmission source or another transmission destination, which has received the file, to download, even when the attachment file cannot be delivered with the original e-mail due to a mail server's capacity limit.

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